UNITED STATES
DEPARTMENT OF TRANSPORTATION

Digital Infrastructure & Dynamic Maps

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Digital Infrastructure & Dynamic Maps

- For this presentation, the following definitions are used:
  - “Digital infrastructure” is the system of geospatial data elements that support creation of dynamic maps. It includes the necessary data that define the elements, such as identification, units, precision, and dates. It may include meta-data, such as timeliness and reliability.
  - “Dynamic maps” are those constructs of geospatial data elements that have sufficient detail, precision, and timeliness to support connected and automated vehicle operation. Different applications may require different types of dynamic maps.
- Supporting standards:
  - ISO 14825:2011 – Geographic Data Files
  - OpenLR – Open Source Location Referencing

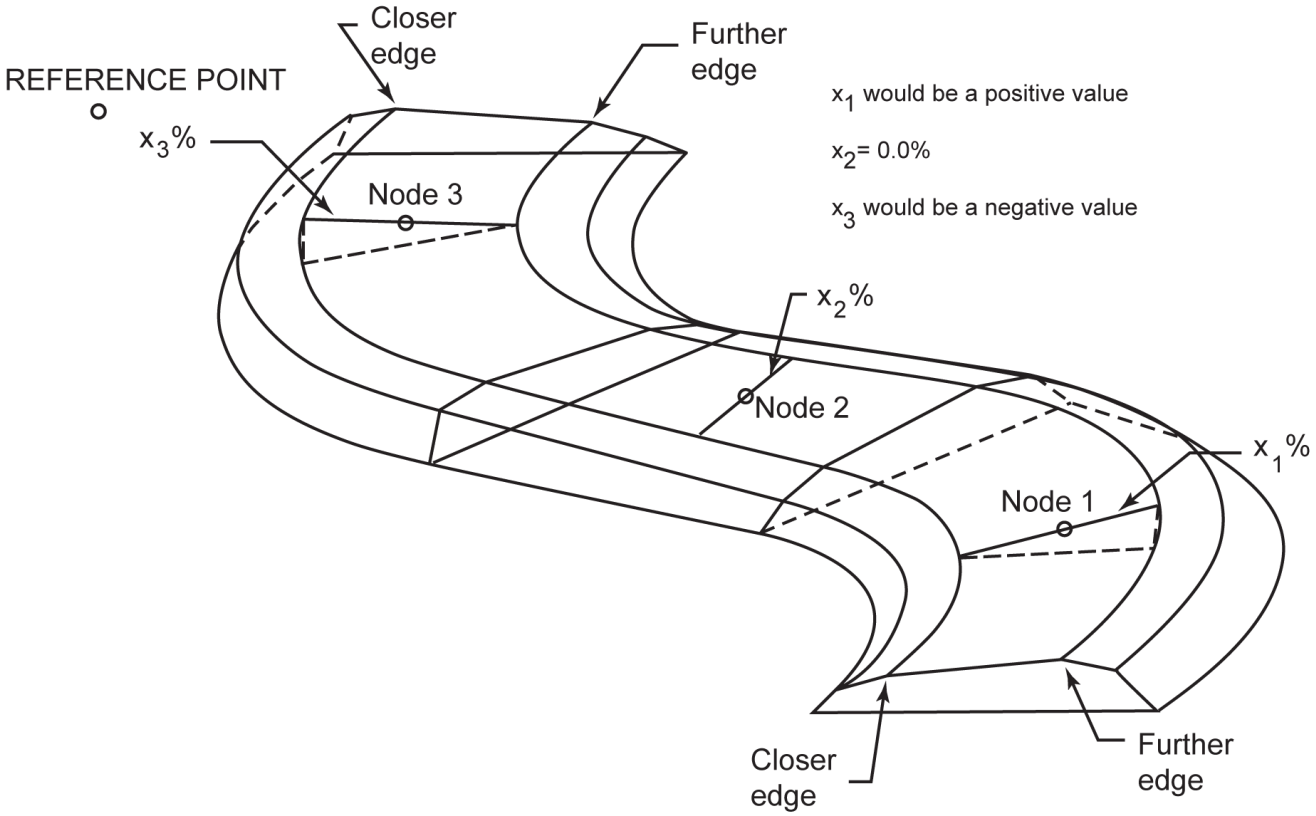
Connected Vehicle Operations

- V2I safety applications
  - Localized requirements – “here and now”
  - Requires absolute position relative to built infrastructure
    - Required precision – based on use case
      - Velocity and timing sensitive
  - Existing navigational maps not sufficient
  - Requires information not available through on-board sensors and maps (e.g., SPaT and frictional coefficient)
- Mobility / Environment applications
  - Local and extended requirements
  - Existing navigational maps typically sufficient
  - Greater precision required for intersection-related applications
  - Extensions of automation?

Automated Vehicle Operations

- Machine vision versus dynamic maps
  - Humans principally navigate by vision – should automated vehicles do the same?
    - 80 percent of the cerebral cortex is devoted to processing visual information – can a vehicle support this demand?
    - Limits to visual information (range, impacts of weather and sun angle, changes to scenery)
    - Maps provide “look ahead” information
    - Visual information may more readily support tactical maneuvers
- Connected-automated versus autonomous
  - Local broadcast of high precision dynamic maps and time-critical updates
  - Storage and processing limits
  - Benefits of V2I applications

Example of V2I Data



For each lane on a roadway segment, an RSU shall include the superelevation, or banking of the roadway, as part of the geometric information broadcasted to connected devices. The superelevation, in tenths of a percent, is measured at each node across the width of the lane. (SAE J2735)

Challenges – Dynamic Maps

- Defining required data elements and their parameters
- Establishing interfaces between organizations that may create/own the digital infrastructure data, developers of dynamic maps, and users of the maps
- Defining interfaces between the systems that contain the maps, such as in-vehicle navigation systems, and the advanced driver assistance systems that reference/use the maps
- Establishing standards and methods for updating maps, both the reference map and distributed maps (in-vehicle)
- Establishing a common location reference system

Public versus Private Sector Roles

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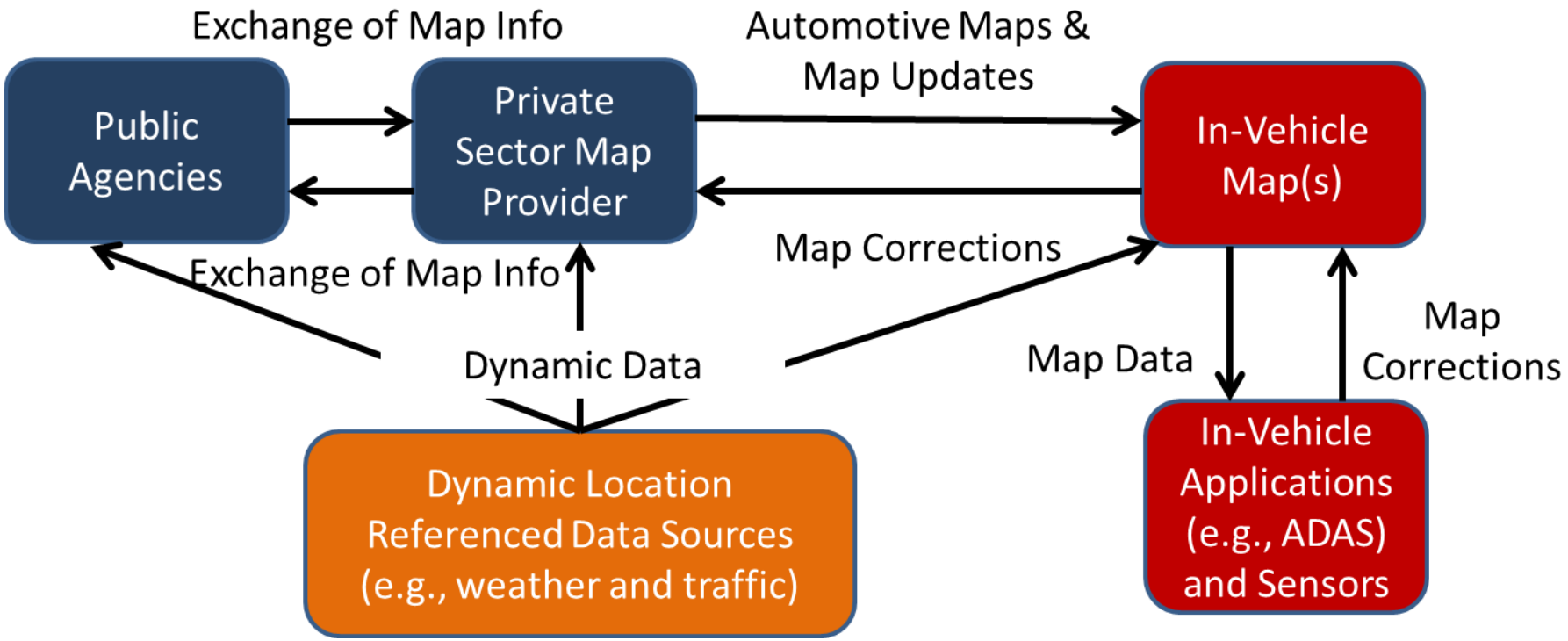
Interactions



Based on a diagram from a presentation titled "ADASIS needs for certification," Jean-Charles Pandazis, ERTICO, presented at the Standardisation and Certification Workshop, Brussels, 15 May 2013.

U.S. Activities – Road Geometric Data

- Participated in the 2014 GTMA annual meeting to evaluate state-of-art mapping and data acquisition services available to State and local agencies (June 2014)
- Initiated review of connected vehicle use cases that require road geometric data (September 2014)
- Met with US Federal Geographic Data Committee (FGDC) Coordinating Group to discuss potential work to develop national level plan for standards review (October 2014)
- Discussed concept of adding new data elements in the Highway Performance Monitoring System (HPMS) data dictionary to provide State DOTs with standard for measuring, reporting, and maintaining road geometric data (October 2014)
- Proposed release of a Request for Information on external storage and operations of Federal highway geometric data (tentatively scheduled for early 2015

Contact Information

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